TABLE 12-60
WEIGHT OF EVIDENCE EVALUATION

REMEDIAL INVESTIGATION REPORT
STRATFORD ARMY ENGINE PLANT
STRATFORD, CONNECTICUT

				TIDAL FLATS			OUTFALL 008			MARINE BASIN	
ASSESSMENT ENDPOINT[a]	RISK QUESTIONS	MEASUREMENT ENDPOINT[a]	WEIGHT[b]	SITE RISK[d]	POTENTIAL STRESSORS[f]	INCREMENTAL[e]	SITE RISK[d]	POTENTIAL STRESSORS[f]	INCREMENTAL[e]	SITE RISK[d]	POTENTIAL STRESSORS[f]	INCREMENTAL[e]
A1. Protection of benthic macroinvertebrate community structure in the Intertidal Mudflats, Marine Basin, and Outfall 008 Drainage.	Are levels of site contaminants in surface water and sediment sufficient to cause adverse effects to aquatic populations?	1. Comparison of tissue concentrations with tissue benchmarks (Critical Body Residues).	Medium to High	Yes	Inorganics A-1254	No	Yes	Inorganics	No	Yes	Inorganics	No
		2. Evaluation of sediment toxicity test results	Medium	Yes	Unk.	N/A	Yes	Ba Cr Cu A-1260	Yes	No		N/A
		3. Evaluation of aquatic macroinvertebrate community struction and function	Medium to High	No		N/A	Yes	Unk	N/A	No		No
		4. Comparison of surface water and sediment COPC concentrations to aquatic benchmarks	Low to Medium	Yes		Yes	Yes	Sw-none SED - Cr	Yes	Yes	Sw-none SED - acenaphthene, Cu, A-1260	Yes
Conclusions based on weight of evidence:		Tissue concentrations of some inorganics exceed CBRs; however, they are comparable to tissue concentrations from reference locations. Toxicity test results indicate that sediments in certain areas of the Tidal Flats and Outfall 008 may pose a risk to invertebrates. There is a great deal of uncertainty associated with the results of the toxicity tests, as there were conflicting results between tests conducted at different times and with different organisms. The observed toxicity in the Tidal Flats could not be linked to any particular analyte and appears to be due to other environmental factors. Toxicity at Outfall 008 may be due to chromium, Aroclor-1260, as well as barium and copper. Aquatic macroinvertebrate community data suggest possible shifts in benthic community assemblage at nearshore stations in Tidal Flats, and Outfall 008; however, the overall abundance of benthic organisms at these locations is comparable to that at upstream locations. The most significant function of benthic organisms at the site is as a food source to wading birds, and the abundance data indicate no impact to this function. There are surface water and sediment benchmark exceedances; surface water concentrations are generally consistent with background, but sediment concentrations at some locations are elevated. **Weight of evidence indicates no significant risk to the function of the benthic community in the Tidal Flats and Marine Basin, but potential impacts to that at Outfall 008. Macroinvertebrate community data suggest possible shifts in the benthic assemblage at some nearshore stations in the Tidal Flats and at Outfall 008; however, the overall abundance of benthic organisms, important in their function as a food source to wading birds, does not appear to be impacted. Although there are some elevated concentrations in sediments in some locations in the Tidal Flats and Marine Basin, they do not appear to pose a risk to the benthic community at these locations. Tissue concentrations and toxicity test results are comparable to those at reference locations. Toxicity results at Outfall 008 indicate that potential impacts may be related to site contaminants.**										

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A2. Protection of forage fish in the Intertidal Mudflats and Marine Basin against toxic effects on survival, growth, and reproduction from exposure to COPCs	Are levels of site contaminants in surface water and sediment sufficient to cause adverse effects to forage fish populations?	1. Comparison of tissue concentrations with tissue benchmarks (Critical Body Residues).	High	Yes	Inorganics	No		N/a		Yes	Inorganics	No
		2. Comparison of surface water and sediment COPC concentrations to aquatic benchmarks	Low to Medium	Yes		Yes		N/a		Yes	Sw-none SED - acenaphthene, Cu, A-1260	Yes
Conclusions based on weight of evidence:		Tissue concentrations of some inorganics exceed CBRs; however, they are comparable to tissue concentrations from reference locations. There are surface water and sediment benchmark exceedances; surface water concentrations are generally consistent with background, but sediment concentrations at some locations are elevated. **Weight of evidence suggests no significant risk to forage fish inhabiting Tidal Flats and Marine Basin; although there are some elevated concentrations in sediments, tissue concentrations are similar to those from reference areas. In addition, species observed at these locations are typical of those that would be expected; the presence of juveniles and fish in breeding condition are indicative of a healthy fish community**									
A3. Protection of predatory fish in the Intertidal Mudflats and Marine Basin against toxic effects on survival, growth, and reproduction from exposure to COPCs	Are levels of site contaminants in surface water and sediment sufficient to cause adverse effects to predatory fish populations?	1. Comparison of tissue concentrations with tissue benchmarks (Critical Body Residues).	Medium	Yes	Inorganics	No		N/a		Yes	Inorganics	No
		2. Comparison of surface water and sediment COPC concentrations to aquatic benchmarks	Low to Medium	Yes		Yes		N/a		Yes	Sw-none SED - acenaphthene, Cu, A-1260	Yes
Conclusions based on weight of evidence:		Tissue concentrations of some inorganics exceed CBRs; however, they are comparable to tissue concentrations from reference locations. There are surface water and sediment benchmark exceedances; surface water concentrations are generally consistent with background, but sediment concentrations at some locations are elevated. **Weight of evidence suggests no significant risk to forage fish inhabiting Tidal Flats and Marine Basin; although there are some elevated concentrations in sediments, tissue concentrations are similar to those from reference areas. In addition, species observed at these locations are typical of those that would be expected; the presence of juveniles and fish in breeding condition are indicative of a healthy fish community**									

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A4. Protection of shorebirds, waterfowl, and fish-eating birds using the Intertidal Mudflats, Marine Basin, and Outfall 008 Drainage against toxic effects on survival, growth, and reproduction from exposure to COPCs.	Are levels of site contaminants sufficient to cause survival, growth, or reproductive impairment in semi-aquatic birds?	Comparison of modeled dietary doses of sediment COPCs, based on site-specific uptake factors, to literature-derived Toxicity Reference Values (TRVs)	Medium	Yes	Cr in Sed	Yes	Yes	Cr in Sed	Yes	No		No
Conclusions based on weight of evidence:		**Weight of evidence suggests there is no significant risk to semiaquatic birds that may forage at the Marine Basin. However, chromium in Tidal Flat and Outfall 008 sediment may pose a risk to sandpipers if they frequently forage at these locations. Individual sandpipers feeding exclusively in the Tidal Flats may be at risk, however, population-level risks would only exist if a significant portion of the population were to feed exclusively at the Tidal Flats.**										
A5. Protection of semi-aquatic mammals using the Intertidal Mudflats, Marine Basin, and Outfall 008 Drainage against toxic effects on survival, growth, and reproduction from exposure to COPCs.	Are levels of site contaminants sufficient to cause survival, growth, or reproductive impairment in semi-aquatic mammals?	Comparison of modeled dietary doses of sediment COPCs, based on site-specific uptake factors, to literature-derived Toxicity Reference Values (TRVs)	Medium	No		No	No		No	No		No
Conclusions based on weight of evidence:		**Weight of evidence suggests there is no significant risk to semiaquatic mammals such as the raccoon that may forage at any of the three site areas.**										
A6. Protection of individuals of rare, threatened, or endangered species	Are levels of site contaminants sufficient to cause survival, growth, or reproductive impairment in individuals of any rare, threatened, or endangered species (piping plover and roseate tern)?	1. Extrapolation of results for other aquatic organisms, with emphasis on maximum exposure concentrations.	Medium	Yes	Cr in Sed	Yes	Yes	Cr in Sed	Yes	No		No
Conclusions based on weight of evidence:		**Weight of evidence suggests there is a potential risk to piping plovers (but not terns) that may forage at the Tidal Flats and Outfall 008 due to chromium in sediment. Given the limited habitat quality at Outfall 008, risks at this location are considered unlikely. The food chain model assumes the sandpiper (surrogate for the plover) feeds exclusively in the Tidal Flats. However, the Tidal Flats were regularly monitored between May and August 1997, and no piping plovers were observed feeding there. Based on these observations, it is unceratin if piping plovers use the Tidal Flats, and if so, with what frequency. There is no significant risk to either bird species at the Marine Basin.**										

a. Assessment endpoints are discussed in Section 12.1.5
b. Measurement endpoints are discussed in Section 12.1.5
c. Professional assessment of the strength of association between the measurement and assessment endpoints.